

FIRST RESULTS ON RAPID REGISTRATION OF
ELECTRO-ATMOSPHERIC DISCHARGE

M. Bossolasco, I. Dagnino and G. Flocchini

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| (NASA-TT-F-14417) | FIRST RESULTS ON RAPID | N72-32411 |
| REGISTRATION OF ELECTRO-ATMOSPHERIC | | |
| DISCHARGE | M. Bossolasco, et al (NASA) | |
| Jul. 1972 | 5 p | CSCL 04A |
| | | Unclas |
| | | G3/13 43365 |

Translation of "Primi risultati sulla registrazione
rapida delle scariche elettro-atmosferiche",
Geofisica E Meteorologia, Bollettino
della Societa Italiana di Geofis-
ica e Meteorologia, Vol. 18,
No. 3/4, 1969, pp. 90-97.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

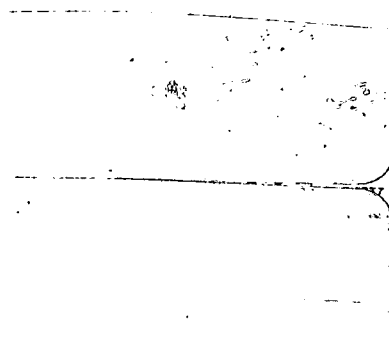
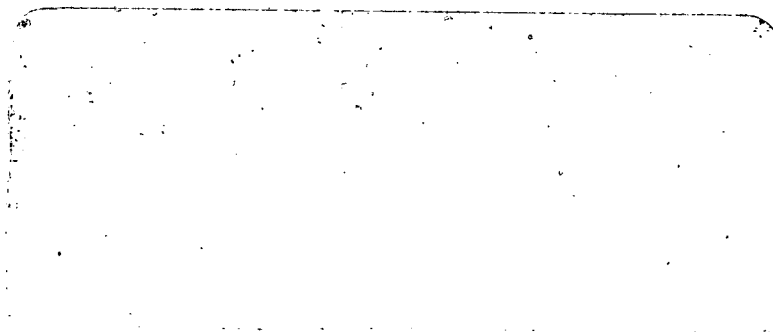
JULY 1972

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From: Geofisica e Meteorologia, v. 8, no. 3/4, 1969, p. 90.



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1. INTRODUCTION.

The present work, which is linked to our preceding other (1962, 1966, 1967) with the rapid entry of electro-atmospheric discharge by way of a CRDF (Cathode Ray Direction Finder), above all with regard to the succession mechanism and to the frequency of same, in relation to the generated meteorological situation in relative stormy phenomenon.

The rapid entries examined were obtained in various groups of days comprised from February 8 to July 13, 1969.

2. INSTRUMENTATION AND ELABORATION OF DATA.

The intensity of the electr-atmospheric discharge, which is for example revealed from a CRDF, depends, more than from the constant instrumental, from the characteristics of the discharge and from the distance from the receiving station. Notedly (see example H. Israel, 1961) between this and the variations of the electro-atmospheric field to the proving ground where a thunderbolt was represented by three factors: one electrostatic (inversely proportionate to the cubic distance) and two of electromagnetic nature (part inductive and radiative, respectively inversely proportionate to the square and to the first force of the distance). The radiative component of the spheric becomes predominant to the one of 300-400 kilometers, first under form of which electromagnetics directs, then normally by major distances of 300-400 kilometers the same whence come one or more times reflected by the inferior ionosphere, to be diffused up to thousands of kilometers of distance from the origin, maximum limit during the night due to more favorable conditions of ionospheric propagation. In general the entries we studied refer to a distance (at Genoa) always above 200 kilometers, for which

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reason it is the only electromagnetic emission taken utilized in conformity to the proper characteristics of the CRDF.

The sensibility of a CRDF is regulatable in a way to adapt it to the results to attain, that depending upon the characteristics of the direction amplifiers.

The CRDF constructed by us is on the line essentially analagous to that of the french "National Meteorology", radio direction-finder called Metox Q-281-A (1952).

The electric schemes of our CRDF are reproduced in figures: I a, b, c, d.

The variants that we carried depend foremost from having employed a tube r.c. Ediswan 30 C9 the photographic registration but above all the horizontal and vertical plates equally sensitive to the deflection. The use of this tube has required an adaptation of the final stages in counter-phase of the direction amplifiers (transformed in exit with a ratio of $1/3$) and of the final stage of the sense amplifier.

The sensitivity of the apparatus was maintained relatively high cost throughout the winter period: which is at the same sensibility adopted by the CRDF N. 1, of the same type, with which for years came photograms of $1/4$ th hour each, in executed continuation of the research in collaboration with the Institute of Bari, Napolie and Trieste for the localization of the spherics on Italy and the bordering regions.

At the end of the present research on CRDF N. 2 the duration of exposure of the photograms has been reduced to 1 minute earlier, this thythm of scansion requires a major luminosity on the screen of the tube r.c. and of consequence the benefit of the sense amplifier is opportunely increased.

The characteristics of the entrance circuits of the direction amplifiers employed are:

effective height of the squares: 10^{-3}

gain of the entrance transformer: 10^2

width of the passing band: 1.5 Kc/sec

resonance frequency of the entrance circuit: 16 Kc/sec

The benefit of the direction amplifiers in the winter period - measured with the introduction of a signal on the grid of the first valve - was stabilized at 170,000, one fifth which is of the maximum obtainable gain. In such a way with our apparatus the nocturnal detectible fixes were up to a distance on the order of 3,000 kilometers; and the line of force of the direction amplifiers from the center to the bottom scale of the tube at r.c. likewise renders possible an examination of the intensity of the single discharge, at least in a relative sense. As for the length of the traces it is proportionate to the tensions that, across the squares and the entrance transformer, is transferred to the accorded circuit of entrance and from this to the grid of the first valve of the direction amplifier.

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Extra (11)

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